

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE

February 2000

BUDGET ACTIVITY

PE NUMBER AND TITLE

03 - Advanced Technology Development**0603601F Conventional Weapons Technology**

COST (\$ in Thousands)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	21,878	20,753	22,731	21,494	23,670	24,244	23,521	Continuing	TBD
63670A Ordnance Technology	9,255	8,683	22,731	21,494	23,670	24,244	23,521	Continuing	TBD
63670B Guidance Technology	12,623	12,070	0	0	0	0	0	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0

Note: Beginning in FY 2001, Project 63670B is combined with Project 63670A.

(U) **A. Mission Description**

This program develops, integrates, and demonstrates advanced affordable state-of-the-art technologies for improving the effectiveness of air launched conventional weapons against fixed, buried, and mobile surface targets and airborne targets. This program includes development of: (1) conventional ordnance technologies including warheads, fuzes, explosives, munition integration, and lethality and vulnerability assessments; and (2) advanced guidance technologies including seekers, navigation and control, target detection and identification algorithms, and simulation assessments for low-cost precision and adverse weather autonomous seekers. Payoffs from this program are more effective, reliable, and affordable air-delivered conventional munitions employable on manned and unmanned aerospace vehicles against surface and airborne targets in the battlefield environment under adverse weather and reduced visibility conditions.

(U) **B. Budget Activity Justification**

This program is in the Budget Activity 3, Advanced Technology Development, since it develops and demonstrates technologies for existing system upgrades and/or new system developments that have military utility and address warfighter needs.

(U) **C. Program Change Summary (\$ in Thousands)**

	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
(U) Previous President's Budget (FY 2000 PBR)	22,791	21,479	22,077	
(U) Appropriated Value	23,244	21,033		
(U) Adjustments to Appropriated Value				
a. Congressional/General Reductions	-453	-28		
b. Small Business Innovative Research	-685			
c. Omnibus or Other Above Threshold Reprogram		-114		

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE

February 2000

BUDGET ACTIVITY

PE NUMBER AND TITLE

03 - Advanced Technology Development**0603601F Conventional Weapons Technology**(U) C. Program Change Summary (\$ in Thousands) Continued

	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
d. Below Threshold Reprogram	-105			
e. Rescissions	-123	-138		
f. Other				
(U) Adjustments to Budget Years Since FY 2000 PBR			654	
(U) Current Budget Submit/FY 2001 PBR	21,878	20,753	22,731	TBD
(U) <u>Significant Program Changes:</u>				
Not Applicable.				

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)

DATE

February 2000

BUDGET ACTIVITY

03 - Advanced Technology Development

PE NUMBER AND TITLE

0603601F Conventional Weapons Technology

PROJECT

63670A

COST (\$ in Thousands)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
63670A Ordnance Technology	9,255	8,683	22,731	21,494	23,670	24,244	23,521	Continuing	TBD

(U) **A. Mission Description**

This project develops and demonstrates the operational effectiveness and military utility of conventional ordnance and guidance technologies delivered from manned and unmanned aerospace vehicles. The project includes development of conventional ordnance including warheads, fuzes, explosives; hard target warheads; bombs, submunitions, and their dispensing mechanisms; weapon airframes and carriage; munition integration; and lethality and vulnerability assessments. This project also develops and demonstrates affordable, autonomous, and adverse-weather advanced guidance technologies for conventional armament, including precision terminal seekers; autonomous seekers for operation in adverse weather; midcourse navigation sensors for standoff delivery weapons; and target detection and identification processing algorithms for reducing target location error and false alarm rates, while improving target kill probability.

(U) **FY 1999 (\$ in Thousands)**

- (U) \$3,307 Developed and demonstrated advanced conventional armament warhead technologies, including heavy metal liners, less sensitive, high blast penetrator explosives, dense metal warhead cases, fragmentation of thick-walled penetrators, advanced warhead shapes for improved penetration, improved warhead metals and design for high impact loading, and directional mass focus warheads. Advanced warhead technologies will provide better target penetration capabilities and enhanced kill probability against fragmentation sensitive targets.
- (U) \$1,900 Developed and demonstrated advanced conventional armament fuze technologies including hard target penetration, low-cost proximity for surface targets, and target imaging detection devices.
- (U) \$4,048 Integrated advanced conventional armament technologies including innovative aerospace vehicle carriage and release equipment, release concepts for small weapons, compact fin folding and deployment mechanisms, and compact airframe design and subsystem integration. Munition integration technologies will provide the capability of multiple carriage of small weapons, and allow communication between the aerospace vehicle and the weapons.
- (U) \$9,255 Total

(U) **FY 2000 (\$ in Thousands)**

- (U) \$3,660 Develop and demonstrate advanced conventional armament warhead technologies including heavy metal liners, less sensitive, high blast penetrator explosives, dense metal warhead cases, fragmentation of thick-walled penetrators, advanced warhead shapes for improved penetration, improved warhead metals and design for high impact loading, and directional mass focus warheads that will provide improved target penetration capabilities, enhanced kill probability against fragmentation sensitive targets, and reduced sorties that will improve pilot survivability and increase aircraft longevity. Design a warhead that is capable of defeating soft targets associated with chemical/biological production and storage.

Project 63670A

Page 3 of 9 Pages

Exhibit R-2A (PE 0603601F)

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)		DATE February 2000
BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
03 - Advanced Technology Development	0603601F Conventional Weapons Technology	63670A
(U) <u>A. Mission Description Continued</u>		
(U) <u>FY 2000 (\$ in Thousands) Continued</u>		
	Explore concepts for neutralizing chemical/biological agents with minimum collateral damage. Complete design of a trimode warhead and weapon electronics for lethal Suppression of Enemy Air Defenses (SEAD) and armor/interdiction missions.	
(U) \$2,852	Develop and demonstrate advanced air-delivered munition fuze technologies including impact shock tolerance for hard target penetration, low-cost height of burst fuzing for fixed surface targets, and target imaging for mobile targets that will improve munitions effectiveness, allow smaller warheads and munition airframes, thereby increasing strike aircraft loadouts and improving sortie effectiveness. Fabricate brassboard multiple event hard target fuze and evaluate its performance by laboratory testing under high-G shock conditions expected for future penetrating weapons. Evaluate capability of tactical ladar seeker to provide accurate fuzing information for trimode warhead.	
(U) \$2,171	Develop innovative air-delivered munition carriage/release equipment, miniature weapon release concepts, and airframe size reduction concepts such as folding fins that will provide the capability to safely carry and launch multiple small weapons, and provide communication between the aerospace vehicle and the weapons, thereby increasing weapon load outs, improving sortie effectiveness and reducing munition airlift requirements for current and future Air Force and Navy strike aircraft. Conduct concept evaluations to establish a low risk operational concept for Unmanned Conventional Aerial Vehicle weapons employment. Complete affordable small munition dispenser design, fabricate wind tunnel model of small munition dispenser, and evaluate performance with wind tunnel tests. Fabricate brassboard small munition dispenser test hardware for ground and flight test.	
(U) \$8,683	Total	
(U) <u>FY 2001 (\$ in Thousands)</u>		
(U) \$4,040	Develop and demonstrate advanced conventional armament warhead technologies that will provide improved target penetration capabilities, enhanced kill probability against fragmentation sensitive targets, and reduced sorties to improve pilot survivability and increase aircraft longevity. Ground test a chemical/biological defeat warhead to characterize effectiveness against production/storage capabilities. Continue developing and evaluating concepts for neutralizing a broad spectrum of chemical/biological agents. Fabricate the trimode warhead and associated weapon electronics, designed in FY 2000, for lethal SEAD and weapons interdiction missions.	
(U) \$5,080	Develop and demonstrate advanced air-delivered munition fuze technologies that will improve munitions effectiveness, allow smaller warheads and munition airframes, thereby increasing strike aircraft loadouts and improving sortie effectiveness. Conduct initial field test of multiple event hard target fuze brassboard design. Develop brassboard design of an integrated fuze, improved target detection device, and directional warhead package.	
(U) \$2,489	Develop innovative air-delivered munition carriage/release equipment, miniature weapon release concepts, and airframe size reduction concepts that will provide the capability to safely carry, launch, and provide communication between the aerospace vehicle and the multiple miniature weapons, thereby increasing weapon load outs, improving sortie effectiveness for current and future strike aircraft while reducing munition airlift	
Project 63670A	Page 4 of 9 Pages	Exhibit R-2A (PE 0603601F)

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)		DATE February 2000
BUDGET ACTIVITY 03 - Advanced Technology Development	PE NUMBER AND TITLE 0603601F Conventional Weapons Technology	PROJECT 63670A
<p>(U) <u>A. Mission Description Continued</u></p> <p>(U) <u>FY 2001 (\$ in Thousands) Continued</u></p> <p>(U) \$2,995 requirements. Continue Unmanned Combat Aerial Vehicle/miniature munition integration and planning support for flight test demonstration. Complete ground and flight test of brassboard small munition dispenser.</p> <p>(U) \$2,995 Develop and demonstrate advanced conventional armament seeker technologies for application to the development of miniature munitions with the capability to autonomously detect, acquire, and guide to targets of interest in adverse weather and battlefield conditions and increase the probability of kill and minimize collateral damage while providing increased weapons load out and improved sortie effectiveness. Develop preliminary design of a terminal lidar seeker for a miniature munition that will be effective against high value fixed targets. Fabricate and captive flight test a low-cost tactical-sized lidar seeker for miniature munitions compatible with Unmanned Combat Aerial Vehicles.</p> <p>(U) \$3,084 Develop and demonstrate advanced conventional armament navigation and control technologies to provide increased armament navigation accuracy, improved standoff range, and enhanced weapon control and operation in electronic jamming environments. Initiate interface design between target detection device, fuze, directional warhead, and weapon terminal guidance seeker. Complete design and fabrication of a integrated lidar terminal seeker and Inertial Navigation System/Global Positioning System navigation and control system.</p> <p>(U) \$5,043 Integrate advanced conventional guidance technologies to provide improved adverse weather performance, faster processing of target information, higher probability of target detection, an operationally acceptable target false alarm rate, and enhance the effectiveness of miniature munitions against both mobile and hardened fixed ground targets to reduce sortie rates, improve mission effectiveness, and reduce collateral damage. Complete flight readiness review and final subsystem integration of an autonomous guidance seeker against ground fixed and mobile targets. Conduct free flight tests and analyze flight test data of a powered miniature munition with integrated lidar seeker and Inertial Navigation System/Global Positioning System guidance to validate design and determine target false alarm rate.</p> <p>(U) \$22,731 Total</p> <p>(U) <u>B. Project Change Summary</u> Not Applicable.</p> <p>(U) <u>C. Other Program Funding Summary (\$ in Thousands)</u></p> <p>(U) Related Activities:</p> <p>(U) PE 0602602F, Conventional Munitions.</p> <p>(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.</p> <p>(U) <u>D. Acquisition Strategy</u> Not Applicable.</p>		
Project 63670A	Page 5 of 9 Pages	Exhibit R-2A (PE 0603601F)

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)		DATE February 2000
BUDGET ACTIVITY 03 - Advanced Technology Development	PE NUMBER AND TITLE 0603601F Conventional Weapons Technology	PROJECT 63670A
(U) <u>E. Schedule Profile</u> (U) Not Applicable.		
<div> <div>Project 63670A</div> <div>Page 6 of 9 Pages</div> <div>Exhibit R-2A (PE 0603601F)</div> </div>		

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)								DATE February 2000	
BUDGET ACTIVITY 03 - Advanced Technology Development				PE NUMBER AND TITLE 0603601F Conventional Weapons Technology				PROJECT 63670B	
COST (\$ in Thousands)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
63670B Guidance Technology	12,623	12,070	0	0	0	0	0	Continuing	TBD
<p>(U) <u>A. Mission Description</u> This project develops and demonstrates affordable, autonomous, and adverse weather advanced guidance technologies for conventional armament delivered from manned and unmanned aerospace vehicles. This project develops the following technologies: precision terminal seekers for enhanced target destruction; autonomous seekers for operation in adverse weather for increased accuracy; midcourse navigation sensors for standoff delivery weapons; and target detection and identification processing algorithms for reducing target location error and false alarm rates, while improving target kill probability.</p> <p>(U) <u>FY 1999 (\$ in Thousands)</u></p> <p>(U) \$7,752 Developed and demonstrated advanced conventional armament seeker technologies including laser radar, millimeter wave, synthetic aperture radar, and conformal seeker arrays for multi-mode applications. These affordable seeker technologies will provide the capability to autonomously detect, acquire, and guide to targets of interest in adverse weather conditions while increasing probability of kill.</p> <p>(U) \$1,082 Developed and demonstrated advanced conventional armament navigation and control technologies including weapon guidance laws, state vector estimators, autopilots, inertial navigation, aerodynamic control, and anti-jam global positioning system techniques. These technologies will provide increased armament navigation accuracy and enhanced weapon control and operation in a electronic jamming environment.</p> <p>(U) \$3,789 Integrated advanced conventional guidance technologies including seekers, navigation and control, signal and image processing/algorithm technologies, laser radar algorithms, super resolution techniques for millimeter waves and synthetic aperture radar, optical processing techniques, and demonstrated advanced conventional armament guidance capabilities. This guidance capability will provide better adverse weather performance, faster processing of target information, higher probability of target detection, and an operationally acceptable target false alarm rate.</p> <p>(U) \$12,623 Total</p> <p>(U) <u>FY 2000 (\$ in Thousands)</u></p> <p>(U) \$3,699 Develop and demonstrate advanced conventional armament seeker technologies that enable the development of miniature munitions with the capability to autonomously detect, acquire, and guide to targets of interest including fixed targets and ground mobile, in adverse weather conditions while increasing probability of kill and minimizing collateral damage to provide the Air Force and Navy increased weapons load out, improved sortie effectiveness, increased pilot survivability, and reduced aircraft attrition. Fabricate Laser Detection and Ranging (LADAR) brassboard seeker to conduct ground and captive flight tests against fixed and mobile targets. Design a tactical-sized seeker with increased range and resolution capability against a variety of ground targets in adverse terrain and weather conditions.</p>									
Project 63670B			Page 7 of 9 Pages				Exhibit R-2A (PE 0603601F)		

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)		DATE February 2000
BUDGET ACTIVITY 03 - Advanced Technology Development	PE NUMBER AND TITLE 0603601F Conventional Weapons Technology	
		PROJECT 63670B

(U) **A. Mission Description Continued**

(U) **FY 2000 (\$ in Thousands) Continued**

(U) \$2,438 Develop and demonstrate advanced conventional armament navigation and control technologies including weapon guidance laws, state vector estimators, autopilots, inertial navigation, aerodynamic control, and anti-jam global positioning system techniques, to provide increased armament navigation accuracy, improved standoff range, and enhanced weapon control and operation in electronic jamming environments to provide the Air Force with accurate, adverse weather standoff capability that will reduce aircraft attrition, increase pilot survivability, improve weapon accuracy, and increase probability of kill. Complete lattice wing design to extend range of small direct attack bombs. Fabricate lattice wing range extension kits and conduct flight tests to determine effectiveness.

(U) \$5,933 Integrate advanced conventional guidance technologies including seekers, navigation and control, signal and image processing/algorithm technologies, laser radar algorithms, super resolution techniques for millimeter waves and synthetic aperture radar, optical processing techniques, and demonstrated advanced conventional armament guidance capabilities to provide improved adverse weather performance, faster processing of target information, higher probability of target detection, an operationally acceptable target false alarm rate, more robust mission planning capabilities, and enhance the effectiveness of miniature munitions against both hardened fixed targets and mobile ground targets to reduce sortie rates, improve probability of one kill per weapon, reduce logistics requirement by requiring fewer munitions, and decrease pilot workload. Fabricate autonomous guidance search and attack test hardware to demonstrate a capability against ground mobile targets. Investigate optical correlator technology for improving terminal accuracy in standoff weapons.

(U) \$12,070 Total

(U) **FY 2001 (\$ in Thousands)**

(U) \$0 Effort moved to Project 63670A.

(U) \$0 Total

(U) **B. Project Change Summary**
Not Applicable.

(U) **C. Other Program Funding Summary (\$ in Thousands)**

(U) Related Activities:

(U) PE 0602602F, Conventional Munitions

(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U) **D. Acquisition Strategy**
Not Applicable.

Project 63670B
Page 8 of 9 Pages
Exhibit R-2A (PE 0603601F)

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)		DATE
BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
03 - Advanced Technology Development	0603601F Conventional Weapons Technology	63670B
<p>(U) <u>E. Schedule Profile</u></p> <p>(U) Not Applicable.</p>		
Project 63670B		
Page 9 of 9 Pages		
Exhibit R-2A (PE 0603601F)		